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COMPARISON AND EVALUATION OF SCM RESULTS AGAINST OBSERVATIONS

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ABSTRACT

Midlatitude frontal clouds during the subperiods A and E of the ARM March 2000 Cloud IOP at the SGP site have been simulated using SCMs, CRMs, and GCMs. These studies suggest that model problems could arise from biases/uncertainties in the large-scale forcing data, the retrieved cloud properties as evaluation data, and the imperfect physical parameterizations. Our study aims to further evaluate performances of the SCMs derived from the NCAR, GISS, GFDL GCMs and ECMWF IFS and quantify the influences of these uncertainties on the SCM results with a focus on cloud macrophysics, convective-stratiform partitioning, cloud effects on TOA and surface radiative fluxes, precipitation, as well as the effect of precipitation recycling on the evolution of cloud system. Furthermore, a set of forcings will be constructed based on available multiple analysis data, taking into account the relative sensitivity factors of different large-scale meteorological parameters, to drive ensemble SCM simulations and confirm the influence of uncertainties in forcing data. Uncertainties due to model physical parameterizations will be investigated using SCM sensitivity experiments on key parameters associated with some essential fast physics parameterizations (e.g., cloud microphysical, macrophysical, and convective parameterizations).